ENSO Rainfall Relations During GPM—Radar vs. Passive Microwave

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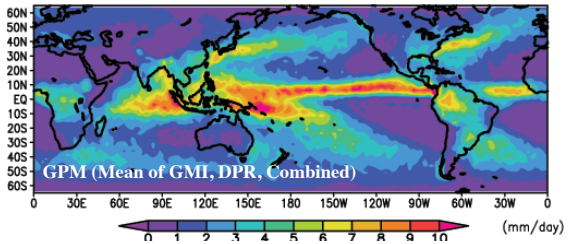
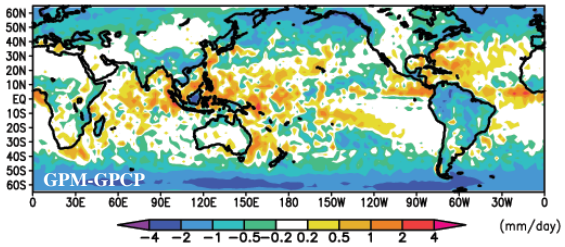
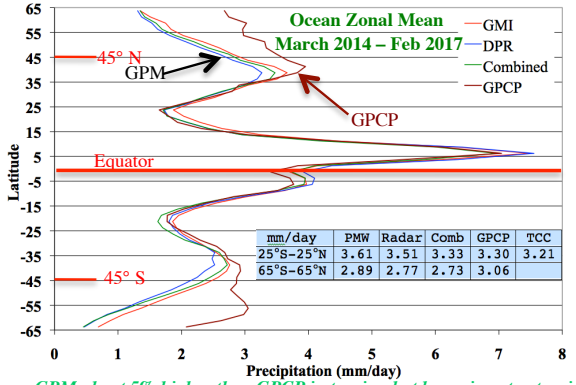
Objectives

- *Utilize data from GPM multiple instruments and algorithms to develop GPM Composite Climatology (GCC) for comparison with and improvement of GPCP.*
- *Analyze large-scale inter-annual variations of rainfall with both PMW and radar observations in relation to ENSO and surface temperature variations and understand differences between radar and PMW results.*

Three-year (2014.03-2017.02) GPM Composite Climatology



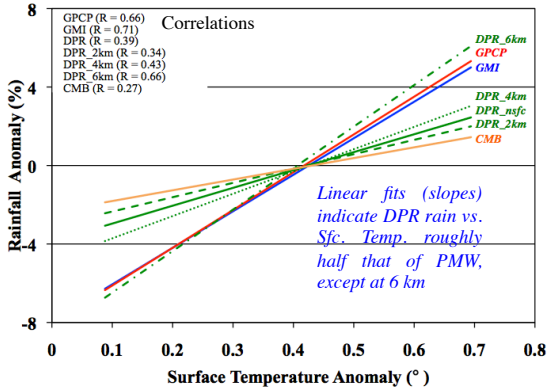




GPM about 5% higher than GPCP in tropics, but lower in extra-tropics

Slopes of GPM-based Monthly Sfc. Temp.-Rainfall Relations (Radar vs. Passive Microwave)

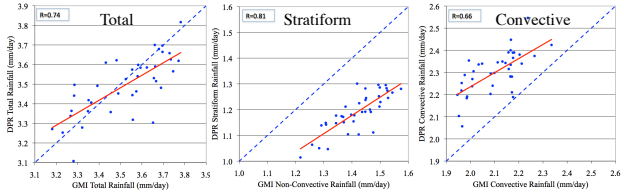
March 2014-Feb 2017 (Ocean, 25°S-25°N)



GPM Radar better confirms PMW T-R relations as compared to TRMM

TRMM Radar (not shown) ~0%/C GPM Radar (NS) ~8%/C PMW ~18%/C

Convective/Stratiform Variations of Tropical (25°S-25°N) Ocean Rain (Active vs. Passive Microwave)

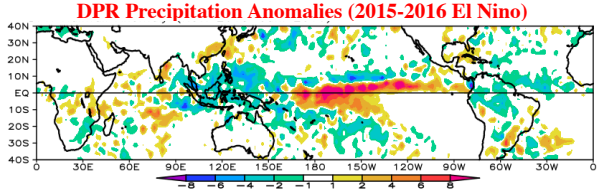


Both Convective and Stratiform portions are correlated (Radar vs. PMW, not quite 1:1 slope), but Radar has lower convective and higher stratiform rain

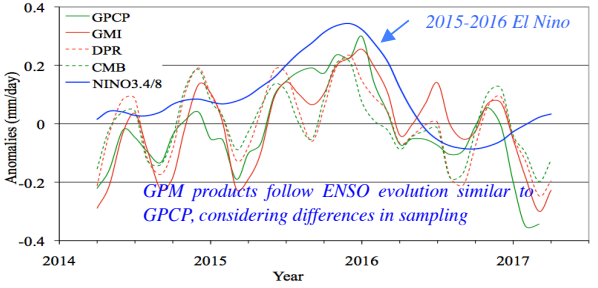
Summary

- **Over tropical oceans GPM-based mean estimates slightly higher (~ 5-8%) than TRMM (and GPCP).**
- **Over high latitude oceans GPM-based mean estimates are low compared to GPCP and CloudSat-based estimates.**
- **GPM radar results for 2014-2017 (including El Nino) better agree with surface temperature – rainfall relations for PMW results (including GPCP) than did TRMM radar results. Reasons for this seem to be related to intense convective rainfall near surface better defined with DPR.**

DPR Precipitation Anomalies (2015-2016 El Nino)



GPM & GPCP Precipitation Ocean Anomalies (25°S-25°N) vs. Nino3.4 (3-month running means)



Percentage of Convective/non-convective (GMI) and convective/stratiform rain (DPR)

	Convective	Non-Convective
GMI (Ocean + Land)	60	40
GMI (Ocean)	60	40
GMI (Land)	61	39
	Convective	**Stratiform**
DPR (Ocean + Land)	65	35
DPR(Ocean)	66	34
DPR (Land)	60	40

Mean Precipitation (mm/day) of Ocean (25°S-25°N) during Mar.-Aug. 2014 (TRMM/GPM Overlap)